Techtalk:
Assistive Technology for Writing

By David C. Caverly

In the first Volume 31 column, Caverly and Fitzgibbons (2007) reviewed Assistive Technology (AT) for reading. This column will focus on AT for writing. How would a writer with disabilities create this column: compose on paper or on a computer, create and follow an outline developed through research online or in a library, collaborate with others on drafts through mobile phones and e-mail, and then send it to the publisher electronically as an attachment?

AT for Writing Access

Outlining/mapping programs like *Inspiration* (2008), *Draft: Builder* (Don Johnston Inc., 2008), or *Visual Thesaurus* (ThinkMap Inc., 2008) can assist students with disabilities (Swd) to store and organize what they generate during the brainstorming step. When more information is found, programs like *Draft: Builder* (Don Johnston Inc.), *EndNote* (Thompson ResearchSoft, 2008), or *RefWorks* (2008) can help Swd input and organize reference citations into APA or MLA format.

For prewriting and composing, text-to-speech software provides auditory feedback for what is encoded. For example, programs like *Write-Out-Loud* (Don Johnston Inc., 2008) or utilities built into the operating system such as *Narrator* (Microsoft Corporation, 2008b) or *VoiceOver* (Apple Inc., 2008b) offer audio-feedback. Thus writing is scaffolded with an oral reading, fostering metacognition and allowing Swd to monitor their composing.

Although these AT solutions are useful for some Swd, and even "garden-variety" immature writers, those with mobility impairments need other ATs to allow encoding. Garrett (2008) suggests no-tech solutions like changing how the pen is held, using felt tip makers to provide less resistance against the paper, or increasing the size of the pen. Defining the boundaries with raised or wax lines, changing the angle of the paper, or even stabilizing the paper with a clipboard can also provide assistance.

Dictating to a transcriber is a light-tech accommodation. Although generally effective, Higgins and Raskind (1995) have reported a social influence when comparing no assistance to transcribed assistance for Swd; when using a transcriber, many students have reported spending less time planning and organizing because they felt they were keeping the transcriber waiting or felt embarrassment about making mistakes or asking for multiple readings of what was written. It is therefore important that AT be contextualized.

Other light-tech writing devices are available such as alternative keyboards that provide larger or smaller than traditional keys, can be configured to be alphabetic keys rather than standard QWERTY format, or can be a one-handed device (AbilityHub, 2008). Keyboard filters can reduce the number of keystrokes needed to enter letters and words. Both operating systems provide keyboard filter technology such as "sticky keys" (where one key represents several key strokes), the ability to change the delay rate (to reduce key repeats), an on-screen keyboard, or shortcut keys for menu navigation (Apple Inc., 2008a; Microsoft Corporation, 2008a). High-tech input devices which replace the keyboard and mouse include touch screens, eye movement electronic pointing devices (e.g., *ERICA Systems*, (Eye Response Technologies, 2008), sip-and-puff systems activated by inhaling and exhaling, wands worn on one's head or chin, or joysticks and trackballs controlled by one's hands or feet (AbilityHub, 2008).

AT for Writing Assistance

Once access is available, high-tech AT devices can assist the writing process. Word prediction software, such as *Co-Writer* (Don Johnston Inc., 2008) or *Read-Write GOLD* (Texthelp Systems, 2007), allows Swd to key in a letter or an initial phoneme, pause, and then receive a list of predicted words (the list can be spoken if clicked). During ideation, relevant words can also be provided to complete a sentence.

Gillette and Hoffman (1995) argued that before word prediction could be effective Swd must have prerequisite literacy skills, such as understanding the purpose and organization of a message as well as the ability to recognize onset in words in order to begin word prediction with a phonemically appropriate letter. Similarly, Mirenda, Tuoldo, and McAvoy (2006) discovered that, when they used word prediction software, Swd found text encoding to be much less efficient and require greater cognitive effort than using word processing or handwriting. Still, MacArthur (1999) found word prediction to be more effective for Swd's encoding when more complex words were required. Others (Tumlin & Heller, 2004) have claimed word prediction works well with other AT devices for students with severe physical disabilities.

Another high-tech AT solution for writing is speech recognition (SR) technology. Swd use voice commands to open and close files or programs, navigate through menus and the Web, and dictate text. Both Mac and Windows operating systems provide SR for keyboard and mouse commands. In the Microsoft *Vista* OS, SR is built into *WordPad* (Microsoft Corporation, 2008c). For most other programs, more robust SR software exists such as *Dragon Naturally Speaking* (Nuance, 2008), *Dictate* (MacSpeech, 2007), *ViaVoice* (IBM, 2005), *Read & Write GOLD* (Texthelp Systems, 2007), or a free program called *NVDA* (NV Access Inc., 2007). SR technology often requires "training" to recognize the Swd's voice, inflection, and dialect which, for all but *Read & Write GOLD*, limits its portability from one computer to another. *Read & Write GOLD* has a *Read & Write GOLD MOBILE* version that allows the software to be stored on a USB flash drive compatible with most computers.

Research has demonstrated SR is effective contextually. Higgins and Raskind (1995) found among 29 college students with a learning disability that SR was more effective for longer words and more complex words than transcription or word processing. Not surprisingly, SR has been more effective if preceded by planning and organizational thinking before encoding (Honeycutt, 2003; Quinlan, 2004). Koester (2004) found SR to be more appropriate when dictation outpaced typing speed for Swd.

Conclusion

In the end, Assistive Technology provides access and assistance for Swd who might not otherwise have success with writing. Still, having access is not enough. Swd need to be assisted in their selection of the variety of AT that best fits their needs, trained how to use the various types of AT, and supported by their families to maintain continued use beyond instructors' purview.

References

AbilityHub. (2008). *Assistive technology solutions*. Retrieved April 8, 2008, from http://www.abilityhub.com/

Apple Inc. (2008a). *Accessibility* [Computer software]. Retrieved April 8,

2008, from http://www.apple.com/accessibility/
Apple Inc. (2008b). *VoiceOver* [Computer software]. Cupertino, CA: Author. Retrieved April 8, 2008, from http://www.apple.com/accessibility/voiceover/
Caverly, D. C., & Fitzgibbons, D. (2007). Techtalk: Assistive technology. *Journal of Developmental Education, 31*(1), 38-39.
Don Johnston Inc. (2008). *SOLO® Literacy Suite*: *Co:Writer, Draft:Builder, Write:OutLoud, Read:OutLoud* [Computer software]. Volo, IL: Author. Retrieved April 8, 2008, from http://www.donjohnston.com/products/cowriter/solo_literacy_suite.html
Eye Response Technologies. (2008). *ERICA system* [Computer software]. Charlottesville, NC: Author. Retrieved April 14, 2008, from http://www.eyeresponse.com/
Garrett, J. T. (2008). Using speech recognition software to increase writing fluency for individuals with physical disabilities. (Doctoral dissertation, Georgia State University, 2008). *Dissertation Abstracts International, 68*,07.
Gillette, Y., & Hoffman, J. L. (1995, March). *Getting to word prediction: Developmental literacy and AAC*. Paper presented at the Tenth Annual International Conference, Technology and Persons with Disabilities, Center on Disabilities, California State University, Northridge. Retrieved March 19, 2008, from http://www2.edc.org/ncip/LIBRARY/wp/Gillette.htm
Higgins, E., & Raskind, M. (1995). Compensatory effectiveness of speech recognition on the written composition performance of postsecondary students with learning disabilities. *Learning Disabilities Quarterly, 18*(2), 159-174.
Honeycutt, L. (2003). Researching the use of voice recognition writing software. *Computers and Composition, 20*(1), 77-95.
IBM. (2005). *ViaVoice* [Computer software]. Retrieved April 8, 2008, from http://www.nuance.com/viavoice/pro/
Inspiration™. (2008). *Voluntary product accessibility templates*. Portland, OR: Inspiration Software, Inc. Retrieved April 10, 2008, from http://www.inspiration.com/vpat/index.cfm
Koester, H. H. (2004). Usage, performance, and satisfaction outcomes for experienced users of automatic speech recognition. *Journal of Rehabilitation Research & Developmental Review, 41*, 739-754.
MacArthur, C. (1999). Word prediction for students with severe spelling problems. *Learning Disability Quarterly, 22*, 158-172.
MacSpeech. (2007). *Dictate* [Computer software]. Retrieved April 8, 2008, from http://www.macspeech.com/index.php?cPath=85
Microsoft Corporation. (2008a). *Accessibility in Windows Vista*. Retrieved April 14, 2008, from http://www.microsoft.com/enable/products/windowsvista/
Microsoft Corporation. (2008b). *Narrator*. Retrieved April 14, 2008, from http://www.microsoft.com/enable/training/windowsvista/narrator.aspx
Microsoft Corporation. (2008c). *Windows speech recognition*. Retrieved April 14, 2008, from http://www.microsoft.com/enable/products/windowsvista/speech.aspx
Mirenda, P., Turoldo, K., & McAvoy, C. (2006). The impact of word prediction software on the written output of students with physical disabilities. *Journal of Special Education Technology, 21*(3), 5-12.
Nuance. (2008). *Dragon Naturally Speaking* (Version, 9) [Computer software]. Burlington, MA: Author. Retrieved April 14, 2008, from http://www.nuance.com/naturallyspeaking/
NV Access Inc. (2007). *NVDA* [Computer software]. Retrieved April 8, 2008, from http://www.nvda-project.org/
Quinlan, T. (2004). Speech recognition technology and students with writing difficulties: Improving fluency. *Journal of Educational Psychology, 96*(2), 337-346.
Refworks. (2008). *Refworks* [Computer software]. Bethesda, MD: Author. Retrieved April 8, 2008, from http://www.refworks.com/
Texthelp Systems. (2007). *Read&Write GOLD* [Computer software]. Woburn, MA: Author. Retrieved April 8, 2008, from http://www.texthelp.com/page.asp?pg_id=10059
ThinkMap Inc. (2008). *Visual thesaurus* [Computer software]. New York: Author. Retrieved April 14, 2008, from http://www.visualthesaurus.com/
Thompson ResearchSoft. (2008). *Endnote* (Version, X1) [Computer software]. Philadelphia, PA: Author. Retrieved April 8, 2008, from http://www.endnote.com/
Tumlin, J., & Heller, K. W. (2004). Using word prediction software to increase typing fluency with students with physical disabilities. *Journal of Special Education Technology, 19*(3), 5-14.

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~~Thomasson, J., & Pesut, R. (1999). *Experiencing algebra*. Upper Saddle River, NJ: Prentice Hall.~~
~~Wilson, M. R., & Krapfl, C. M. (1994). The impact of graphics calculators on students' understanding of function. *Journal of Computers in Mathematics and Science Teaching, 13*(3), 252-264.~~